



**INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH
TECHNOLOGY**

**ALLOCATION OF SUBSCRIBER NUMBERS FOR TELECOMMUNICATION USING
INFORMIX-4GL**

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ABSTRACT

The paper aims at creating an application for allocating numbers for a telecom company. The service provider gets the prefix from a regulatory body like TRAI. Based on that prefix the service provider has to generate its numbers. After the numbers are generated it has to be transferred specifically to various domains like prepaid and postpaid from where they are allotted to customers. This application will take care of number allocation process as well.

The system also assigns a colour to the number. Colour is defined by the easy remembrance pattern present in the number. Really good numbers are given gold status, (e.g. 08281000000), then silver - not quite as good, then bronze - not so good again. Anything else will be assigned as normal number. The system must prevent from generating numbers which are already allocated i.e., the numbers which are in use, by any other instance should not be available for use in future.

KEYWORDS: UNIX, INFORMIX, Telecommunication, Subscribers.

INTRODUCTION

This paper aims at creating a multi-user, portable and secure application built on UNIX Version- HP 11.11 platform. This application offers the telecom company representatives an interface to generate the subscriber numbers and transfer the same to various regions for allocation based on the area code. This system provides a user interface that allows the representatives to navigate through the pop-up window and select the appropriate option. This system provides with interactive forms which are developed using IBM's INFORMIX-4GL which interacts with the database using UNIX environment.

The system involves two major activities namely generation of number range and allocation of these numbers to different business instances. In addition, this paper allows the users to extend the functionality of application to generate the reports, which include the details about the subscriber number series with corresponding description associated with the numbers.

PROMINENT TRAITS OF THE SYSTEM

- The application is developed in 3-layer architecture i.e. Front Layer, Service Layer and Database Layer, which allows better maintenance, extensibility of the product.
- This is a multi-user system developed in UNIX environment which keeps the database updated when used by many representatives concurrently.
- The application is neutral to any platform with minimum hardware requirements.
- The system prevents the users to allocate the customers which are already in use or unavailable by any other means.

PROBLEM DEFINITION

EXISTING SYSTEM

The general architecture has been developed to create a new User Interface that accommodates the Create/Allocate/Transfer (CAT) nature of the system. There is almost no true process metaphor in the legacy Generation and Allocation of Subscriber numbers application, therefore a tab pattern has been chosen in the new system to implement the functionality that is initiated through function keys (F1 to F12). This makes efficient use of screen real estate while maintaining the atomicity of the transactions.

In this architecture, the Front-End Layer is separated from Service Layer and Data Layer. Front-End procedures call the Service Layer procedures which in turn call the Data Layer Procedures. This provides a clean separation between the presentation and business logic layers. Isolating the business logic in the three layers provides the following architectural benefits:

- Improved scalability:
Allows other channels to integrate easily with the any other business components.
- Performance improvement:
Allows the development to more easily proceed in parallel among different skill sets.
- Improved usability:
Changes made in one module does not affects the activities of others, hence improves the reusability of modules.
- Improved readability:
Since the application is divided into several modules, it increases readability of the software.

PROPOSED SYSTEM

To understand the proposed system, let us consider a scenario where a telecommunication company aims at creating an application which provides all of the mobile phone functionality.

When a customer applies for a new subscriber connection, the vendor looks for the available numbers which are already generated and assigned for allocation to the customers. Before this, in background the telecommunication company generates the numbers using prefix range allocated to it by a regulatory body like TRAI. Then the company can either issue numbers to the customers directly or they may use another company to sell the numbers and services on the consumers.

The telecommunication company uses this application to generate numbers within this range which contains two subsystems namely:

- a) CREATION of Subscriber Numbers, and
- b) TRANSFER of Subscriber Numbers.

- TRANSFER of Subscriber Numbers :

As the subscriber numbers are been generated, this subsystem is concerned with transfer of these numbers for allocation. This subsystem makes use of destination, HLR, usage, colour, prefix and amount. Destination is the business instance to which the numbers would be assigned e.g. pre-paid and post paid. HLR is the Home Location Register which contains all the subscriptions that are activated in the network based on the area code. Usage is the MOBILE or FAX for which numbers are generated. Prefix is the allocated range to the telecommunication company. The system also assigns a colour to the numbers. Colour is defined by the easy remembrance pattern presented in the number. The numbers with very good remembrance pattern (e.g. 9916100500) are given GOLD status, likewise bronze – not so good again (e.g. 09976 013722). Anything else will be assigned as normal number. Amount is the total quantity of numbers to be transferred. After this module, the numbers are ready for allocation to the customers.

- Description of Attributes:

Attribute name	Description
Destination	Service Provider Name
HLR Id	HLR (Home Location Register) Id OR Control Group Id
Usage	Usage Name: MOBILE/FAX
Colour	Colour of the Numbers: Normal/Gold/Silver/Bronze
Prefix	Any number prefix allocated for company by regulatory body like TRAI
Amount to send	Quantity of numbers to be allocated (Non zero integer)

Fig 1: Transfer form Attributes

The vendor offers these numbers to the customers on their requirements like usage (MOBILE/FAX), pay-plan (PRE-PAID or POST-PAID), and based on the area code of customer’s location. The customers have the option to choose the numbers having easy remembrance pattern.

The diagram 2 depicts the automated process of this application:

OUTCOME OF STUDY

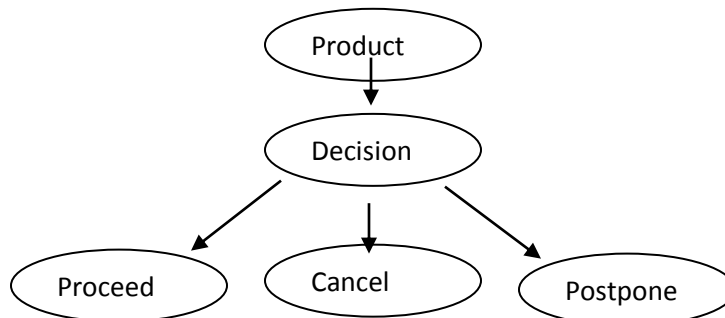


Fig 2: Outcome of Feasibility Study

Papers, which are becoming the subject of feasibility study, will be identified either by senior management, or in organizations, in which users are matured with information technology, by a steering committee comprising user and data processing management. The same was applied to “ALLOCATION OF SUBSCRIBER NUMBERS FOR TELECOMMUNICATION USING INFORMIX-4GL”. The study culminates in written and oral reports. Management uses these reports to make the decision either to proceed with implementing a solution recommended by the study team, to postpone the development or to cancel the paper. So, taking an overall consideration, the paper is said to be feasible and would definitely prove beneficial.

INFORMIX 4 GL

INFORMIX-4GL (or simply, 4GL) is an English-like C or COBOL-replacement programming language that Informix Software, Inc., introduced in 1986 as a tool for database designer to create custom database management applications that access Informix databases. INFORMIX-4GL 7.20.UD8 consists of a suite of tools that allows in efficiently producing complex interactive database applications. It provides native support for INFORMIX-SQL

statements. The SQL provided with Informix is an enhanced version of the industry standard query language developed by International Business Machines Corporation (IBM). In addition to SQL, Informix provides the Stored Procedure Language (SPL) to write stored procedures. Stored procedures are programs that are stored as database objects.

4GL allows building an integrated application that features easy-to-use menus, data entry screens and reports all with significantly less code than conventional programming languages require. Like any programming language, 4GL provides a large number of keywords and logical operations. INFORMIX-4GL is the only multi-purpose programming language that offers code- and display-compatibility across operating environments. Applications developed are portable to the different platforms subject to simple porting guidelines. INFORMIX-4GL also has a solid error-handling scheme to certainly protect the integrity of the data.

This version of 4GL can run on the following types of computers:

- On UNIX character-based terminals provided by a wide variety of hardware vendors
- On UNIX workstations

Informix also provides a Microsoft Windows version of 4GL.

4GL provides a Programmer's Environment with all the tools that makes it easy to create, compile, and maintain large, multi-module programs and screen forms. Applications can also be managed by using commands at the operating system prompt rather than using the Programmer's Environment.

SYSTEM DESIGN

- DESIGN METODOLOGY

System development methodology is the process of developing a system through successive phases in an orderly way. It is a complicated process, as it requires careful planning and execution to meet the goals.

The most creative and challenging phase of the system development process is design phase, it is a solution "how to" approach to the creation of the proposed system. Design, the first step in the development of an engineered product is initiated only after a clear exposition of expected product functions become available. The design of the software system and its component parts should follow an ordinary sequence of steps. The design process continues by means of stepwise refinement through a series of abstraction levels until a physical realization replaces the abstraction. Other design criteria include the following.

- Advantages
 - Simple and easy to use
 - Easy to manage due to the rigidity of the model – each phase has specific deliverables and review process
 - Phases are processed and completed one at a time.

This application uses three layered approach for code design i.e. Front-End Layer, Service Layer and Data Layer. The front-end layer module interacts with the input forms and validates the input fields entered by the user. The front-end layer then interacts with service layer module, which in turn communicates with the Data layer module

Front End / Business Layer
❖ Contains the front-end layer module.
Service Layer
❖ Contains the service layer module.
Data Layer
❖ Contains the data layer module.

Fig 3: Code Design

The data layer module is used to hit the database and fetch the data from the same. This module returns the data to the service layer if the transaction is succeeded; otherwise it raises a status flag as false.

The service layer returns the data to the front-end layer which displays the data into corresponding fields.

INPUT DESIGN

The user interface design was done using the INFORMIX-4GL FORMS. Necessary instructions are displayed to provide information to the user and accept input from the user. The main form provides the user with the basic information regarding the two functional modules and also links that take the user to different input forms i.e. CREATE and TRANSFER FORMS. The forms used in the application allow the user to search the value from the database and select the desired value from the pop-up window for the respective fields. The user can also directly enter the value into field if known. The pop-up window displays the values which are fetched from the database and allows the user to navigate through it and choose the appropriate one. Validations are done using INFORMIX statements. Error messages are prompted to the user to correct entries and submit it again.

Input design is a part of overall system it is the phase that requires careful attention. The input forms have following characteristics:

- User friendliness
- Clear flow of the application

OUTPUT DESIGN

Output is the heart of the all software design. The developed system will be said successful only if the output system provides the necessary reports in necessary format. To keep our software in high grade we need to compose an efficient output design. Matching user requirements-the output must produce what the user needs or wants.

The application generates the reports which contain the details about the generated subscriber numbers after the first CREATE module is executed and after that it generates a report when the TRANSFER module is executed which describes the details of the subscriber numbers which are transferred for allocation to the customers.

Input and Output screens are included in Appendices.

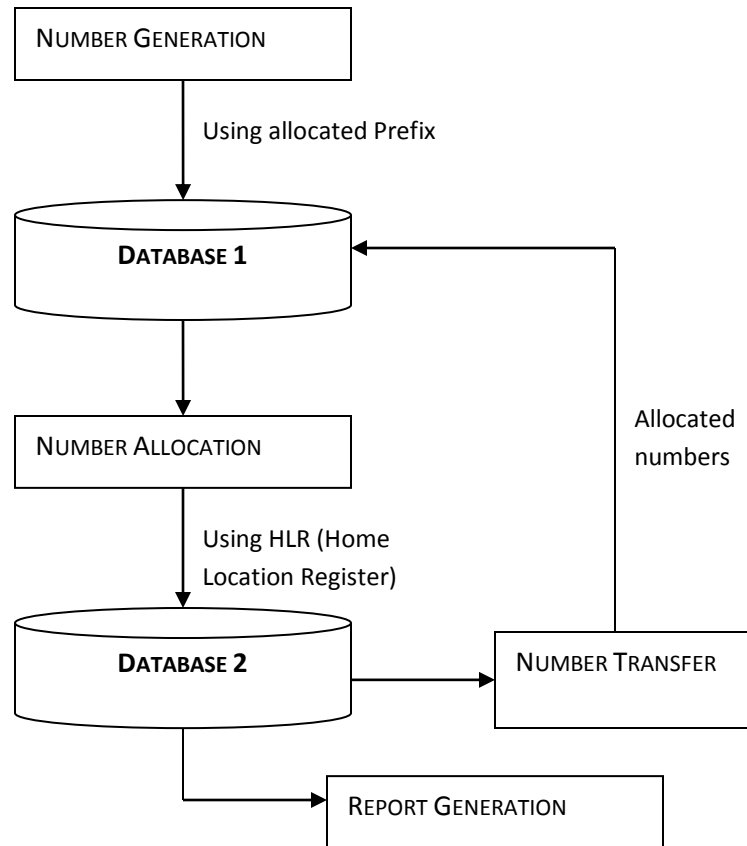
IMPLEMENTATION

Implementation is the stage of a paper during which theory is turned into practice. During this phase, all the programs of the system are loaded onto the client's machine. After loading the system, training of the users starts. Main topics of such type of training are:

- How to execute the package
- How to enter the data
- How to process the data (processing details)
- How to take out the reports

After the users are trained about the computerized system, manual working has to shift from manual to computerized working.

“ALLOCATION OF SUBSCRIBER NUMBERS FOR TELECOMMUNICATION USING INFORMIX-4GL” uses UNIX environment to execute the application. The application can be accessed through the function keys and tabs are used to access various options. The system provides the required functionality to the users i.e. the telecommunication company representatives.



The diagram below depicts the architectural layout of the system: Fig 4: System Architecture

MAINTENANCE

Maintenance is necessary to eliminate errors in the system during its working life and to tune the system to any variations in its working environment. It has been seen that there are always some errors found in the system that must be noted and corrected. It also means the review of the system from time to time. The review of the system is done for:

- Knowing the full capabilities of the system
- Knowing the required changes or the additional requirements
- Studying the performance

If a major change to a system is needed, a new paper may have to be set up to carry out the change. The new paper will then proceed through the entire waterfall life cycle phases i.e. maintenance reapplies each of the preceding phases to an existing program rather than a new one. Since “ALLOCATION OF SUBSCRIBER NUMBERS FOR TELECOMMUNICATION USING INFORMIX-4GL” follows three-layered approach, the maintenance is easier and can be done simply modifying the affected layer. Moreover, the modules can be used again for other tasks as and when needed.



CONCLUSION

Working over the paper, “ALLOCATION OF SUBSCRIBER NUMBERS FOR TELECOMMUNICATION USING INFORMIX-4GL”, has been a great experience with a lot of exposure to various evolving software trends. The paper has been developed for Keane (India) Pvt. Ltd. and it works efficiently under successfully implementation. The paper functions adeptly to fit the expected results and all the risk factors are identified during the system design and appropriate measures are taken to make this paper a hard coded one. With testing the system has been depicted to be reliable and resourceful one. With a full stretch testing, it has been ensured that the system can enhance ideally without any bugs or crashes, which will make the end user more compatible with the paper. Reviews to the paper with the faculty members helped me to rectify the problems as and when occurred and also helped me to get some valuable suggestions that were incorporated in the paper. Developing this paper helped me to gain some experience in real-time development procedures. Hereby I conclude that the system will surely be a valuable proposition in contrast to the changing business requirements and modern day cut throat competition.

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